

Locomotor Inactivity During Sleep as a Method to Indicate Neurodegeneration

Alex Washburn, 2025

This fall, I worked with professor Sarah Harmon on a project pushing forward analysis of a method called Locomotor Inactivity During Sleep. Sleep occurs in “ultradian cycles” alternating between rapid eye movement (REM) and non-rapid eye movement (NREM) sleep, lasting ~90-110 minutes (Winnebeck et al. 2017). NREM-REM cycles involve various physiological oscillations, including body movement: this can be tracked using actigraphy (watch-measured) data, which is what we used for analysis. We examined whether differences in ultradian cycling over the course of a night exist across age, sex, and particularly disease etiology.

We used an existing python package, called pyActigraphy, which provided built-in functionality. However, we expanded on some of that functionality to try to improve the best-fit period detection. At the moment, we are working towards a full-length paper publication. Moreover, we are connecting with researchers and code developers to push forward the period detection issue, including some from universities in the UK and Munich.

Graphs/images/figures (if applicable)

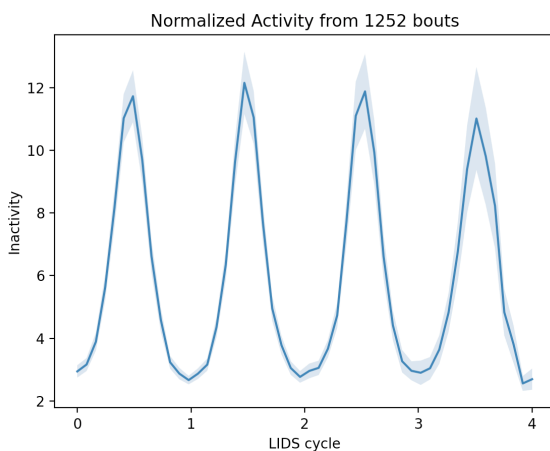


Figure 1. Normalized cycles of movement inactivity as measured from a watch device for n=1252 subjects.

Faculty Mentor: Sarah Harmon

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References

Winnebeck EC, Fischer D, Leise T, Roenneberg T. Dynamics and Ultradian Structure of Human Sleep in Real Life. *Curr Biol*. 2018 Jan 8;28(1):49-59.e5. doi: 10.1016/j.cub.2017.11.063. Epub 2017 Dec 28. PMID: 29290561.

